

FIG. 1
(PRIOR ART)

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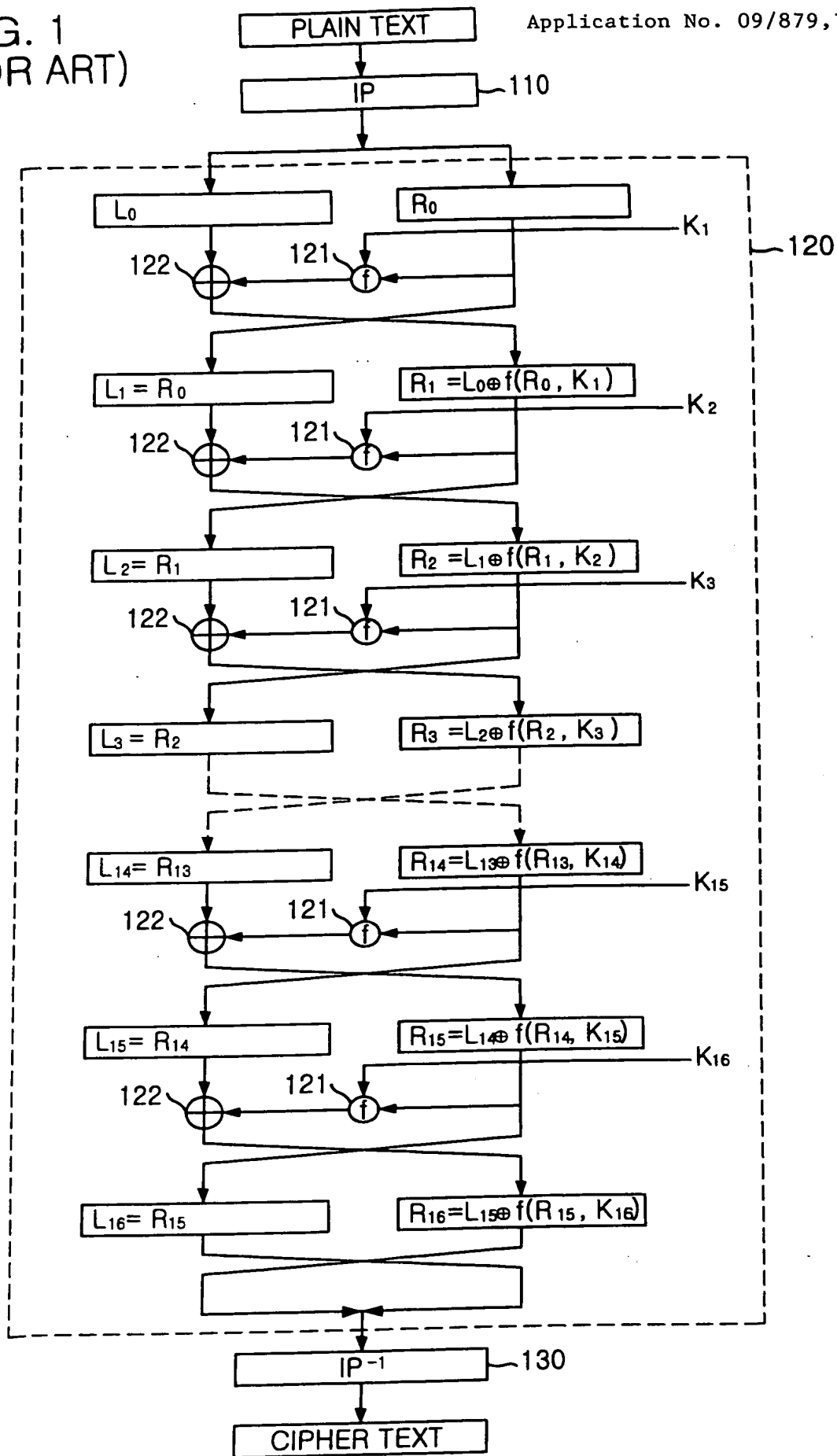


FIG. 2
(PRIOR ART)

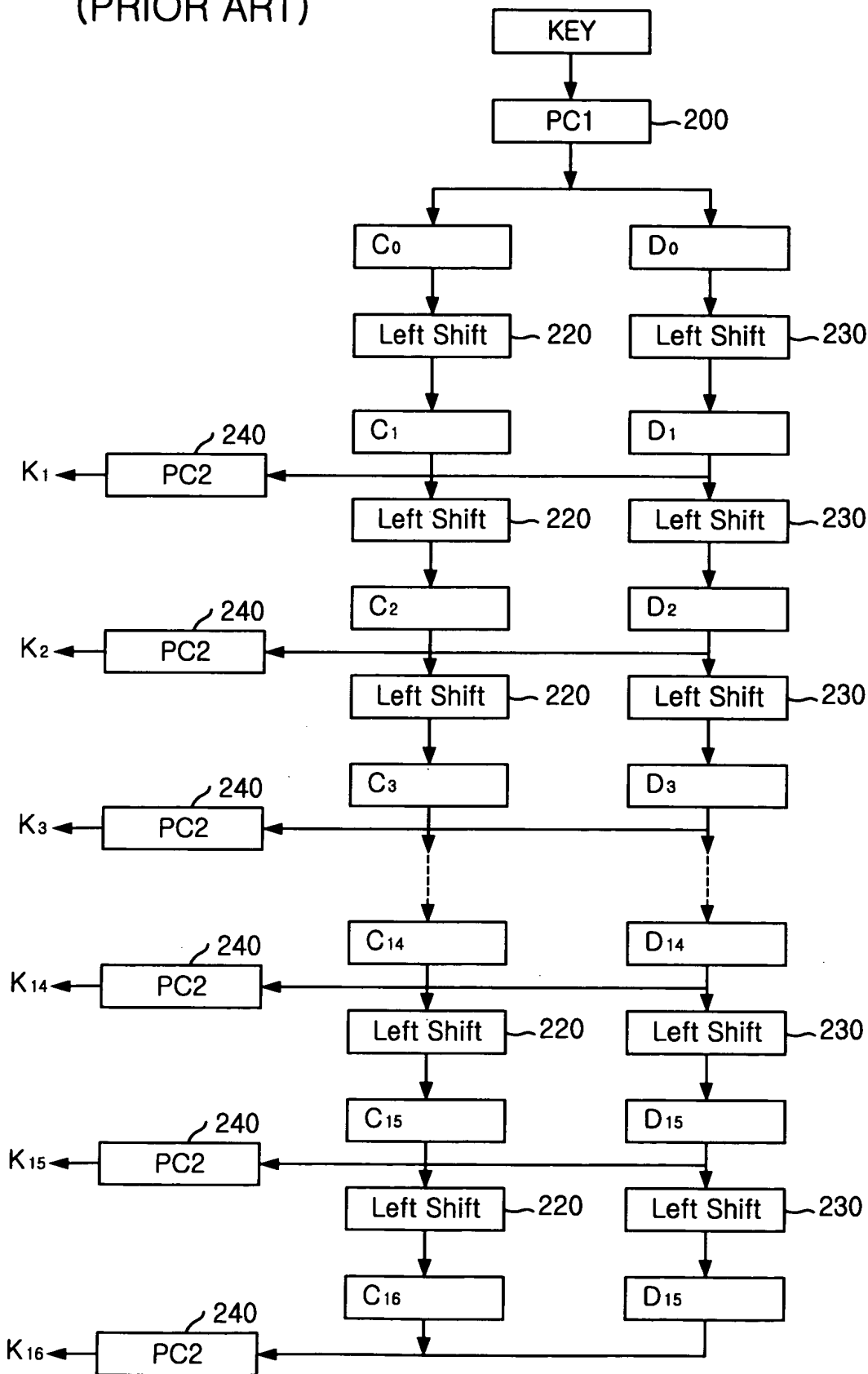


FIG. 3
(PRIOR ART)

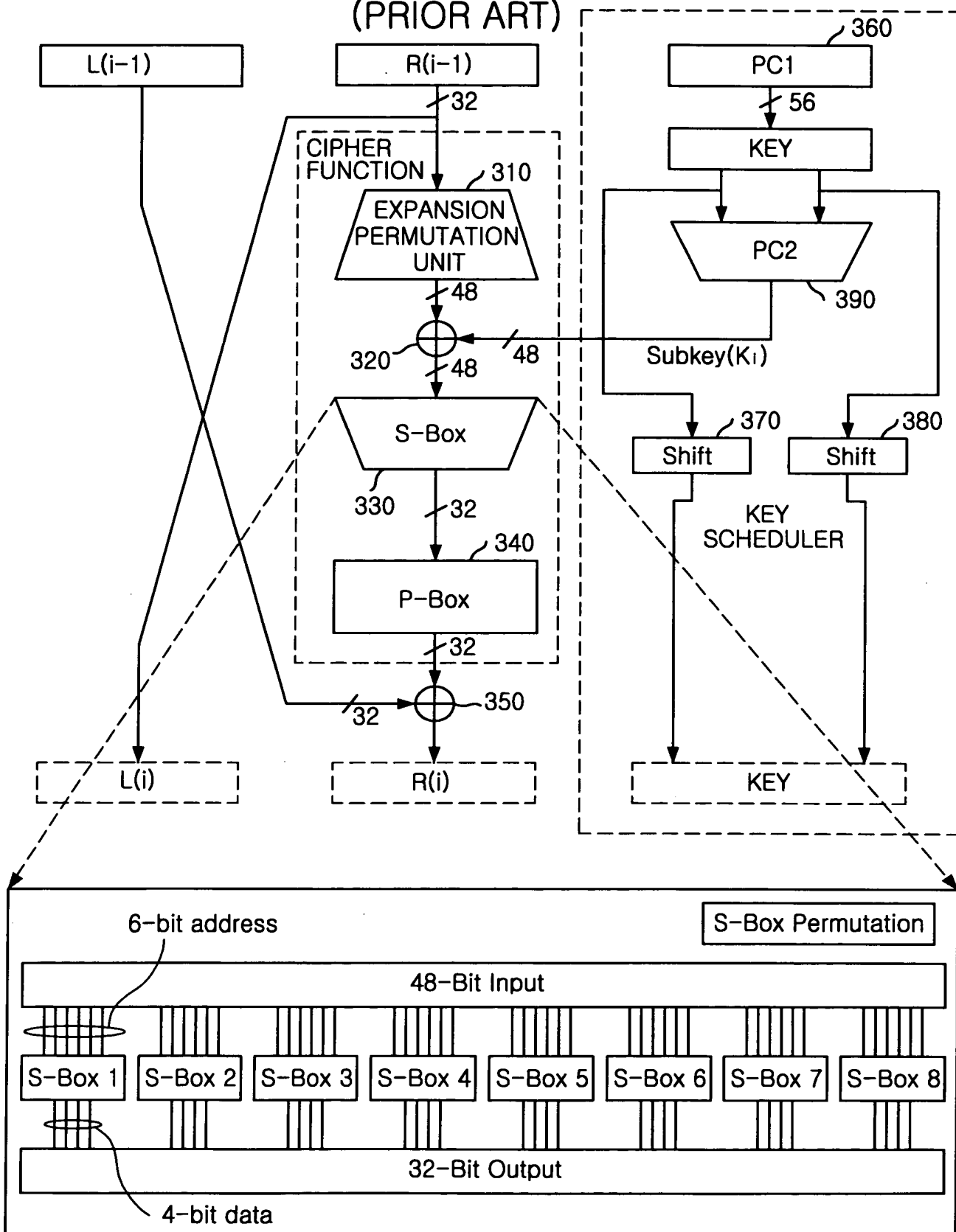




FIG. 4
(PRIOR ART)

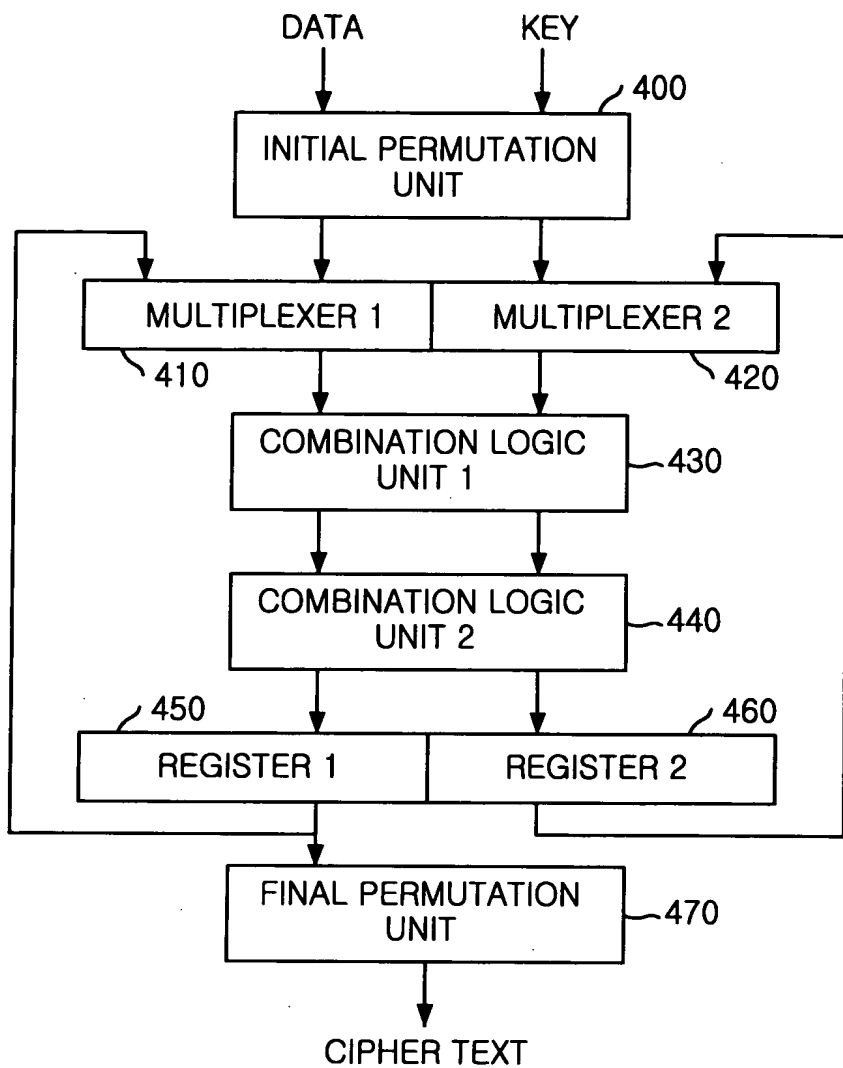
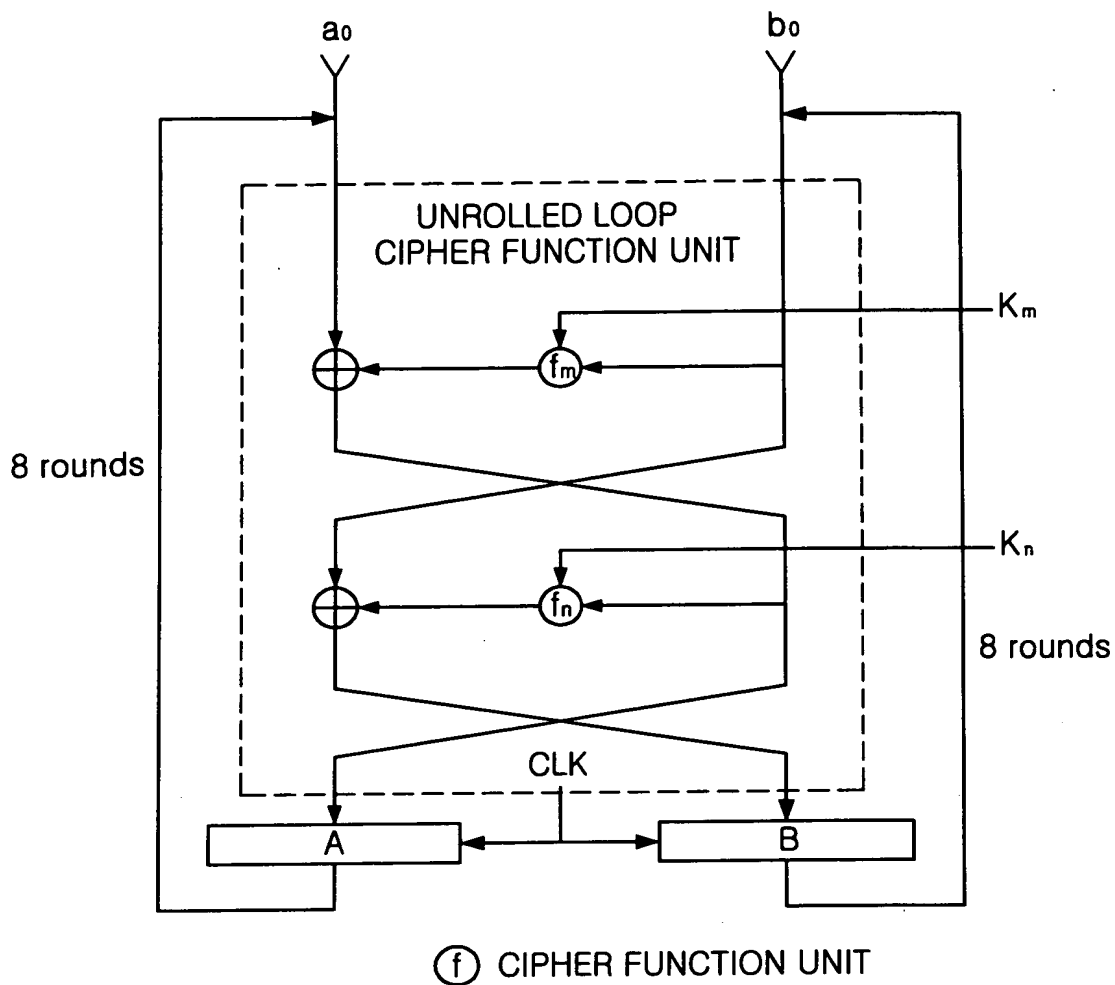




FIG. 5A
(PRIOR ART)





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FIG. 5B
(PRIOR ART)

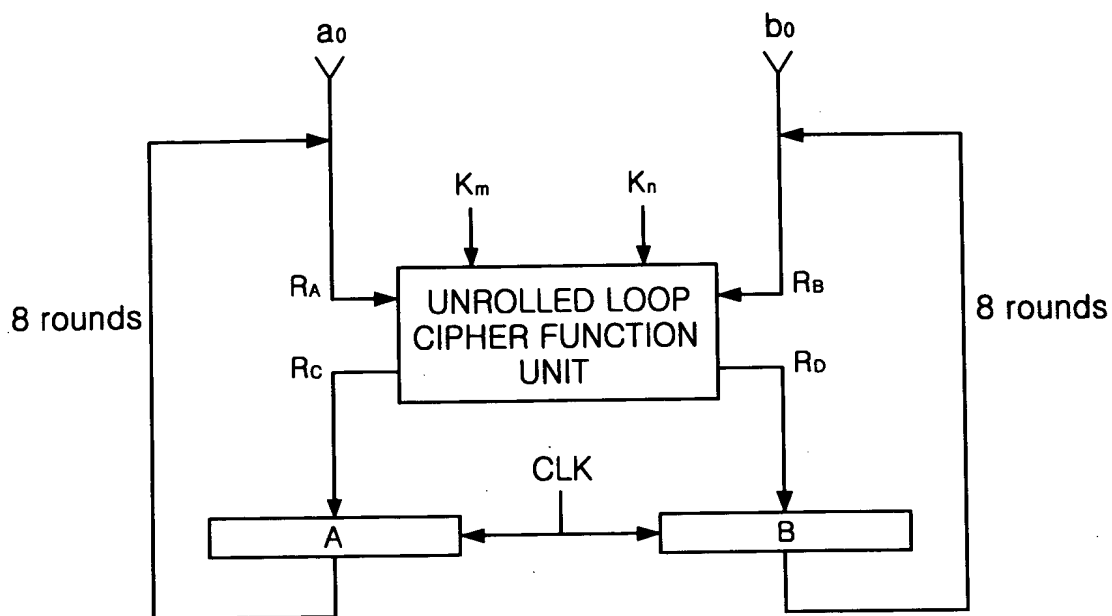


FIG. 6
(PRIOR ART)

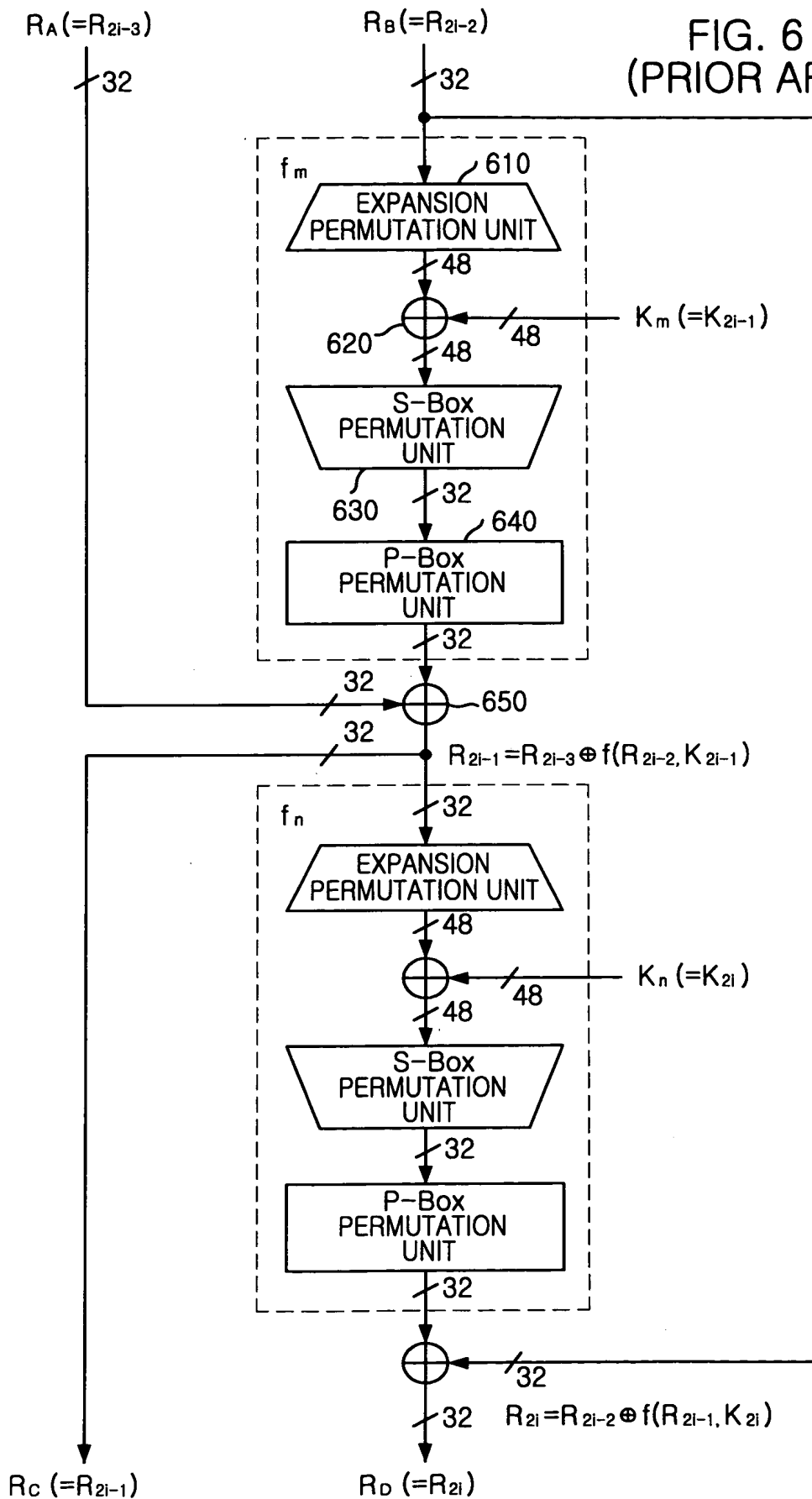


FIG. 7
(PRIOR ART)

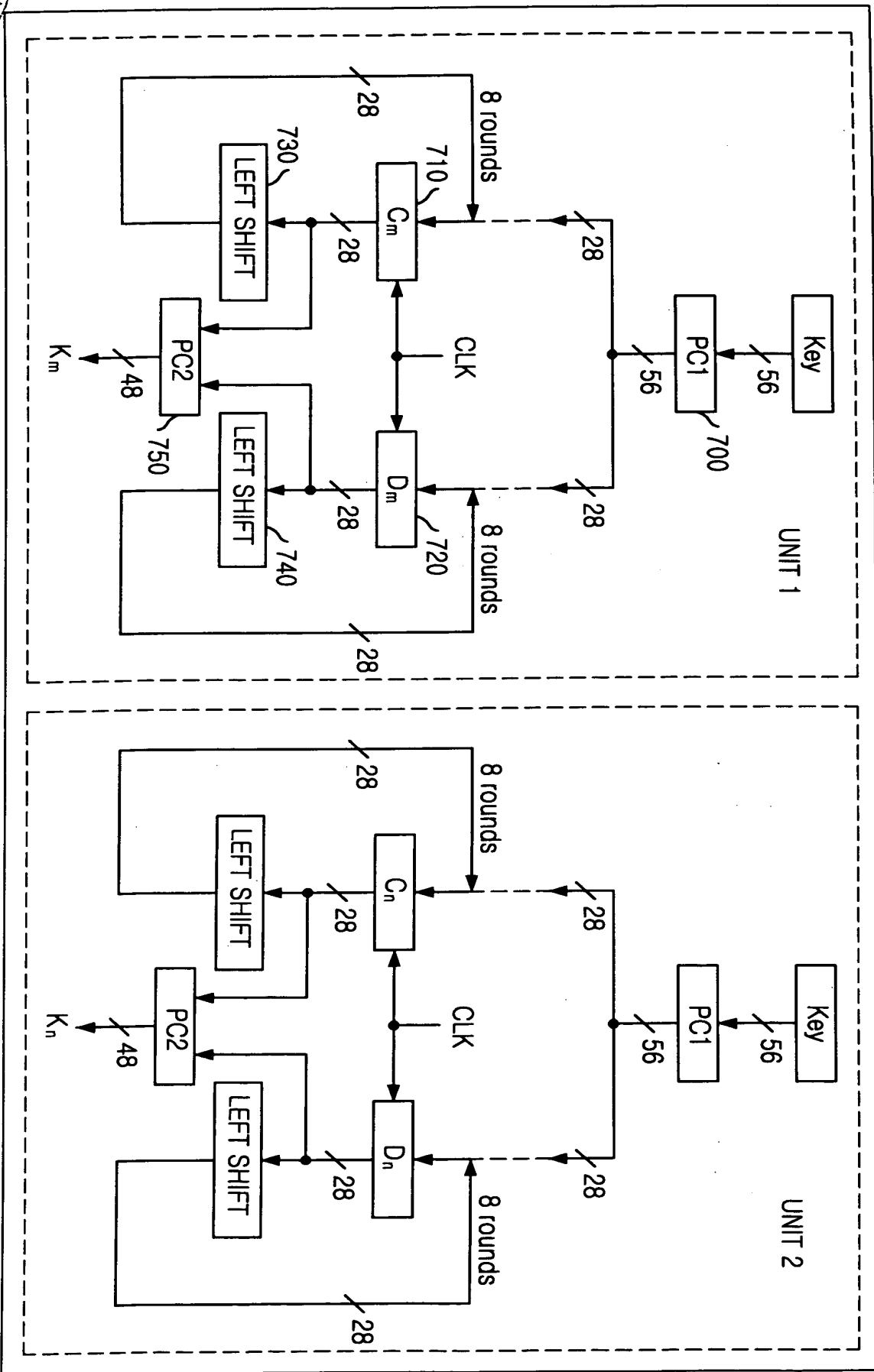


FIG. 8

Round	S_m	TS_m	D_m	TS_n
1(P_0)	3	1	+1	2
2(P_1)	4	4	+2	6
3(P_2)	4	8	+2	10
4(P_3)	3	12	+2	14
5(P_4)	4	15	+2	17
6(P_5)	4	19	+2	21
7(P_6)	4	23	+2	25
8(P_7)	$2*(1)$	27	+1(0)	0

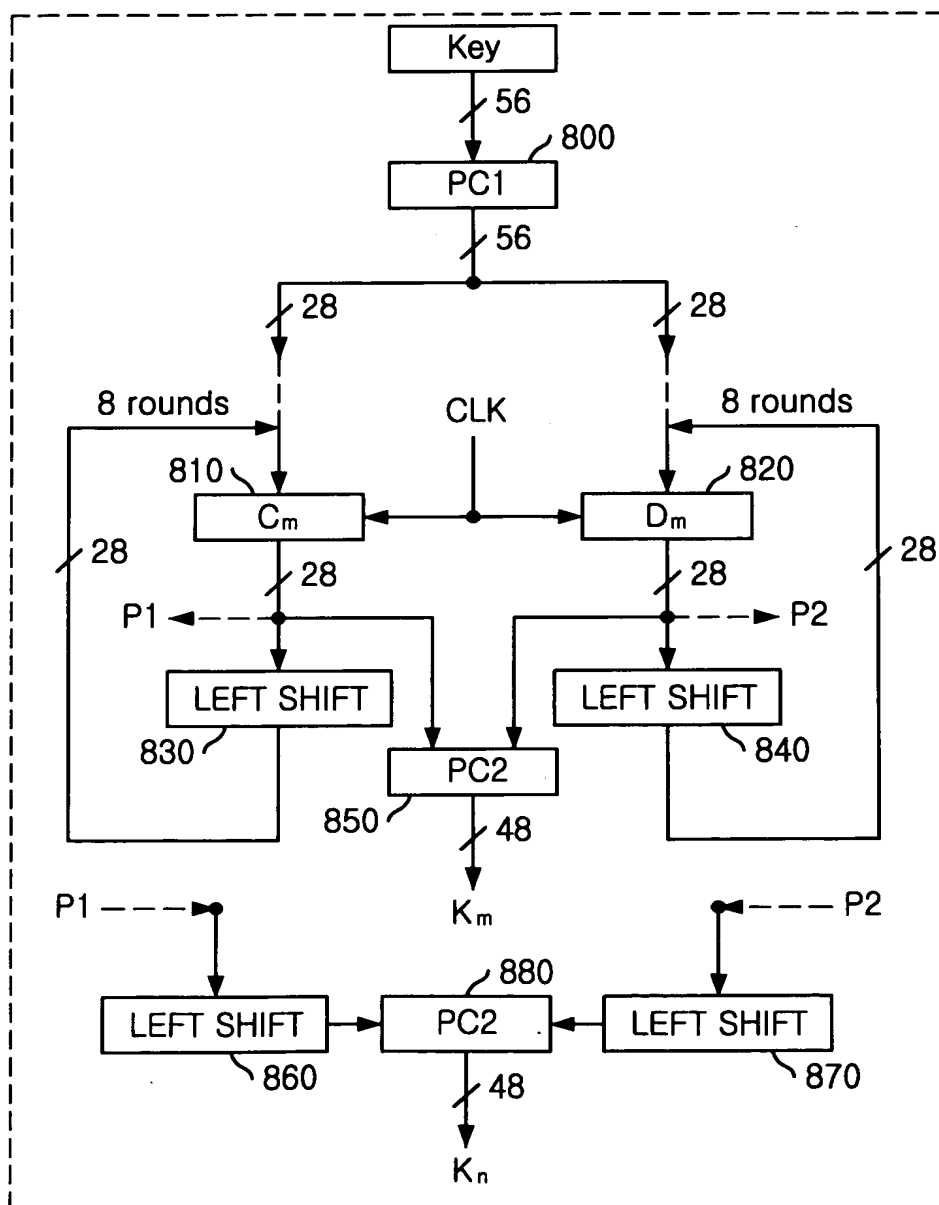


FIG. 9

Round	S_n	TS_n	D_n	TS_m
1(P_0)	4	2	-1	1
2(P_1)	4	6	-2	4
3(P_2)	4	10	-2	8
4(P_3)	3	14	-2	12
5(P_4)	4	17	-2	15
6(P_5)	4	21	-2	19
7(P_6)	3	25	-2	23
8(P_7)	2	0	-1	27

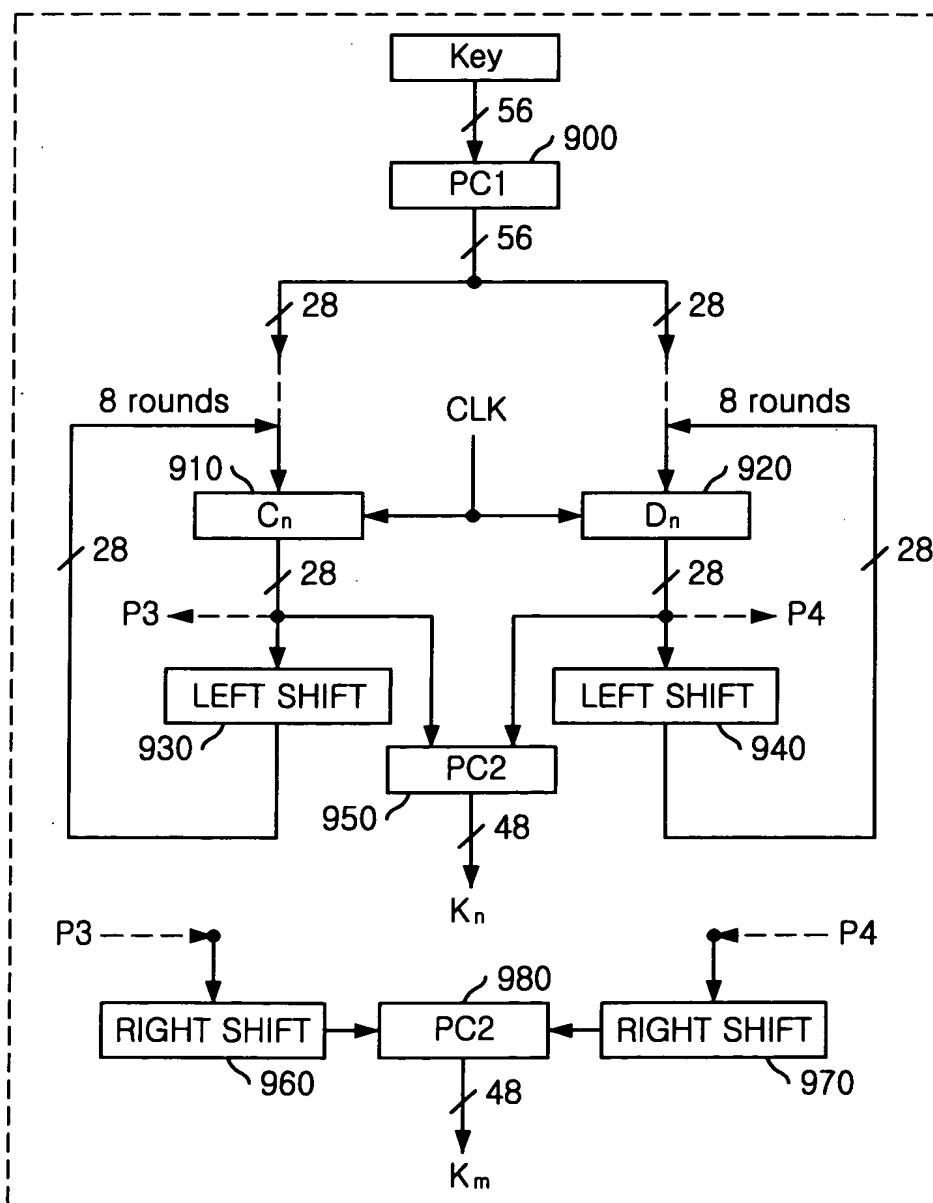


FIG. 10

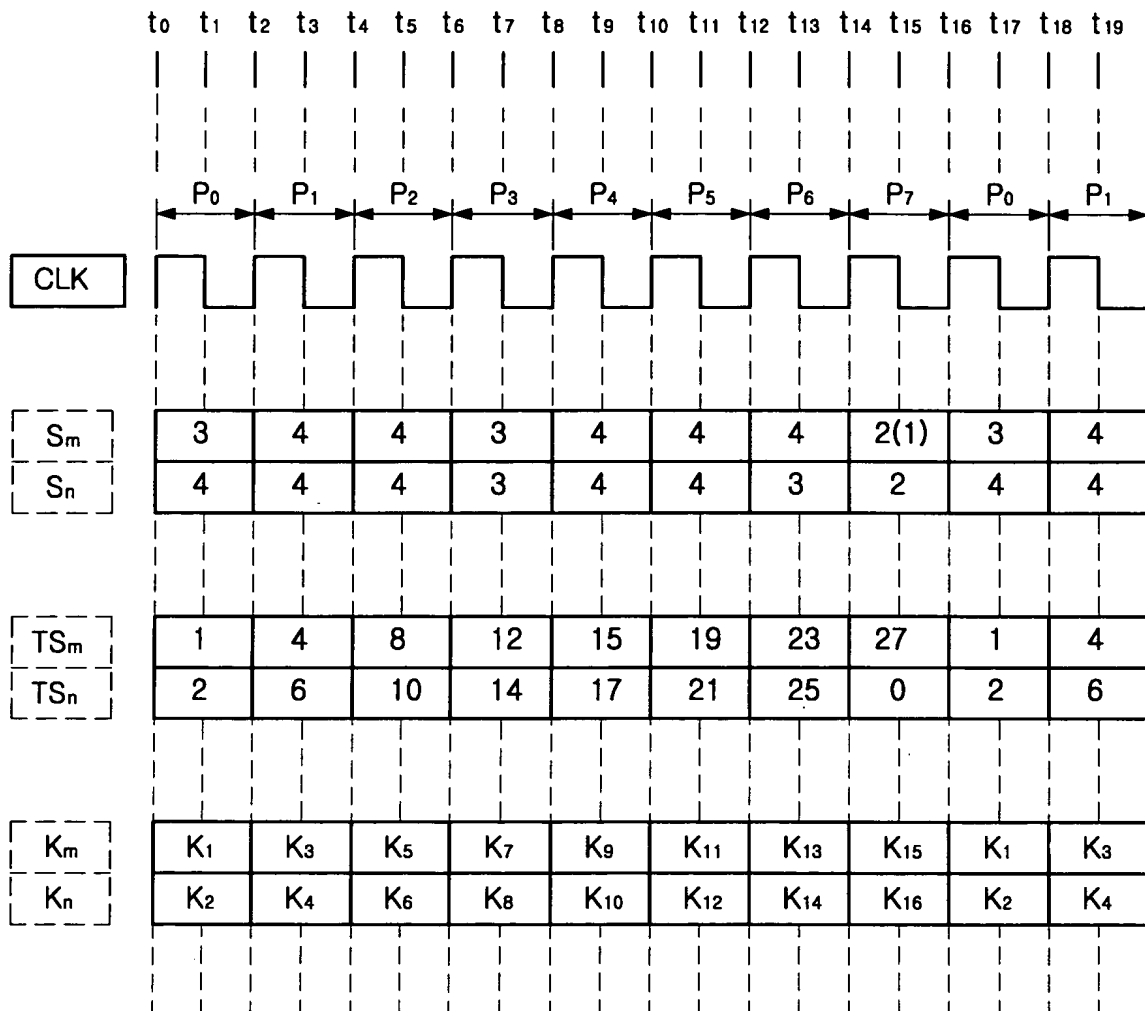


FIG. 11

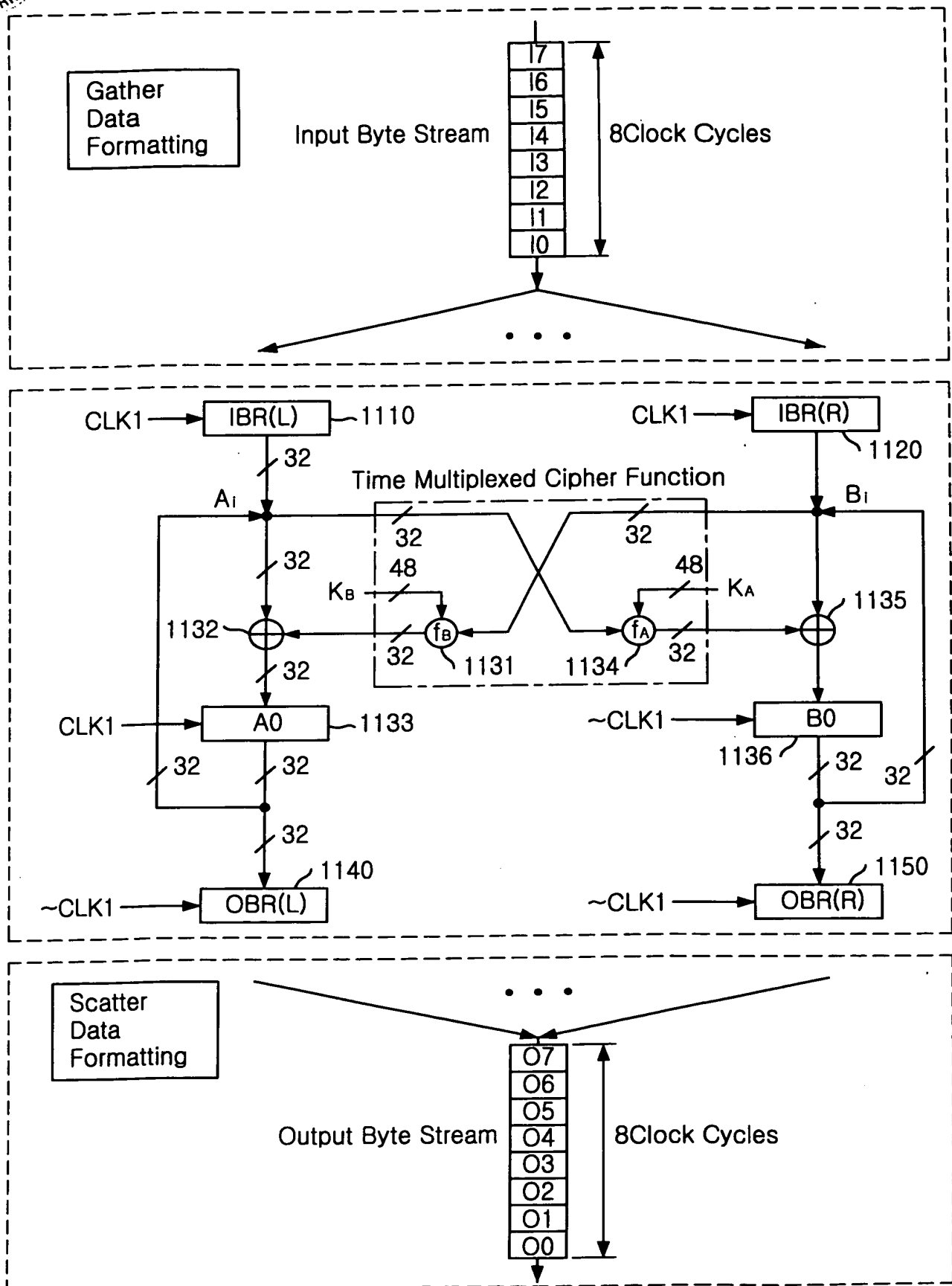




FIG. 12

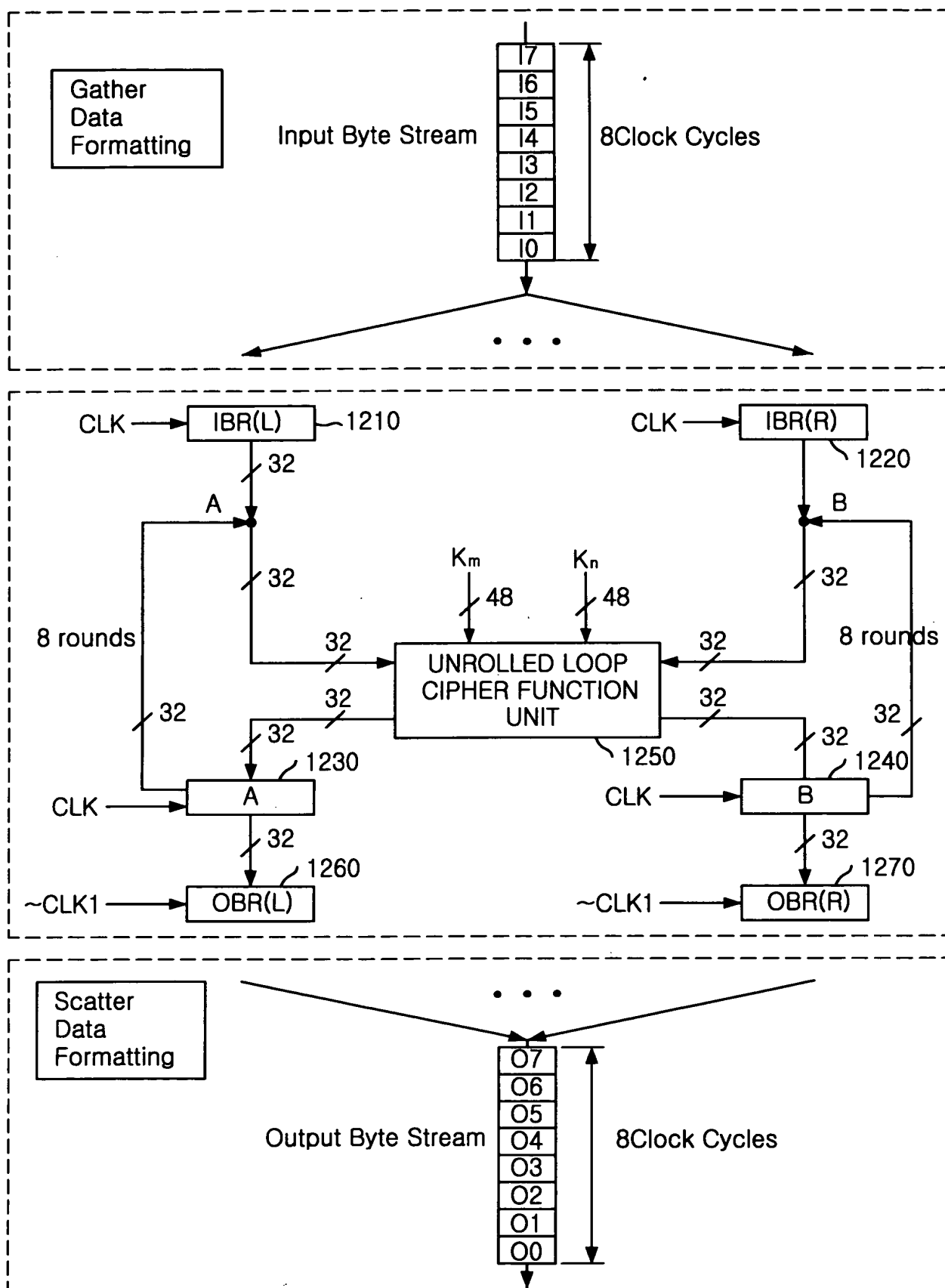




FIG. 13

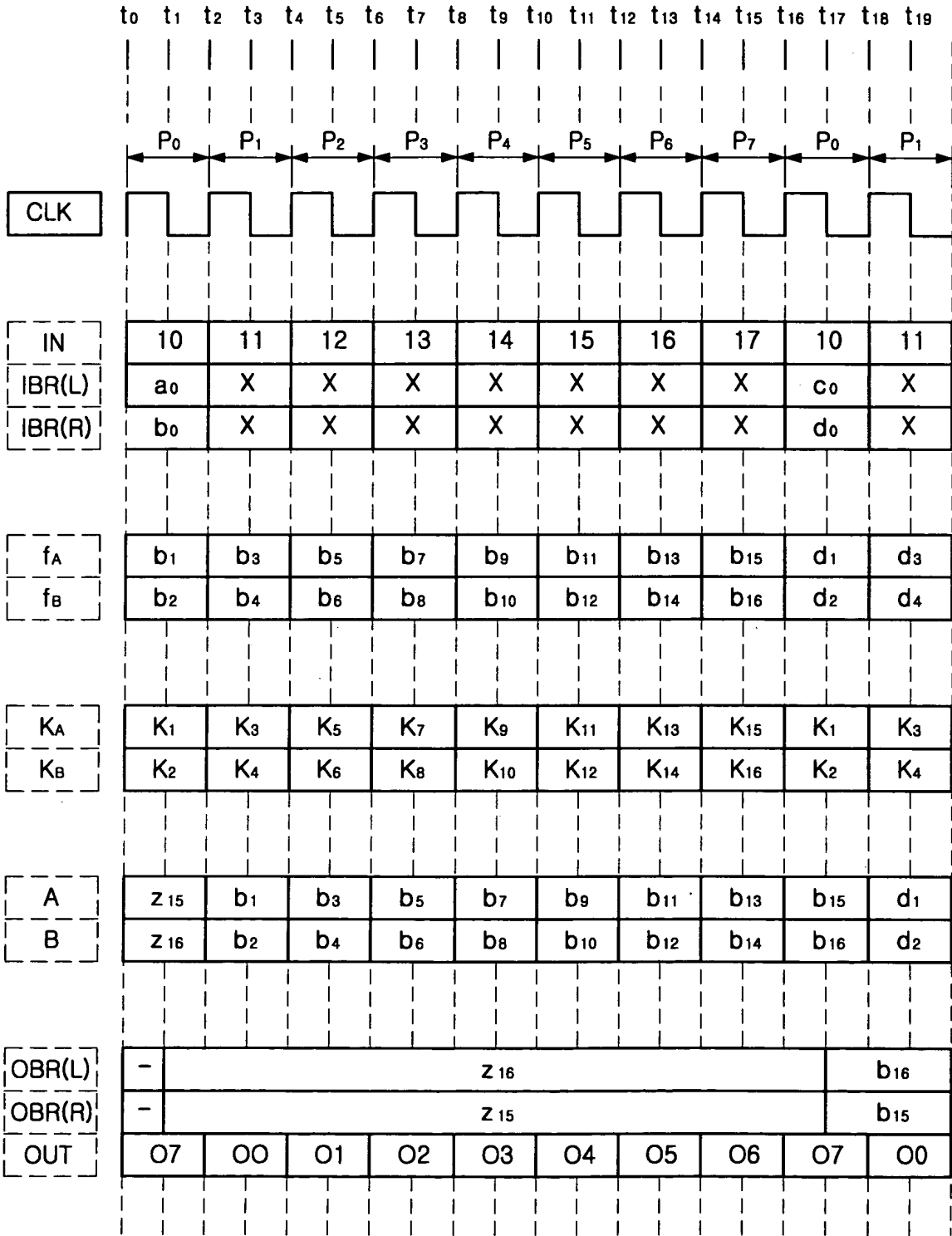
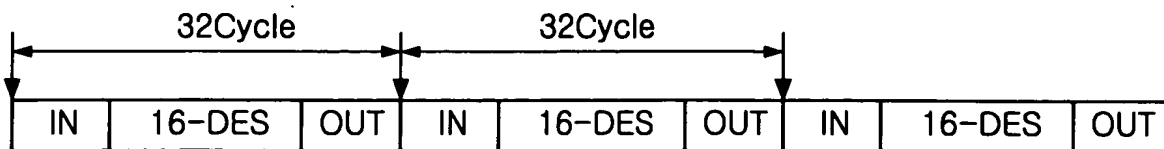




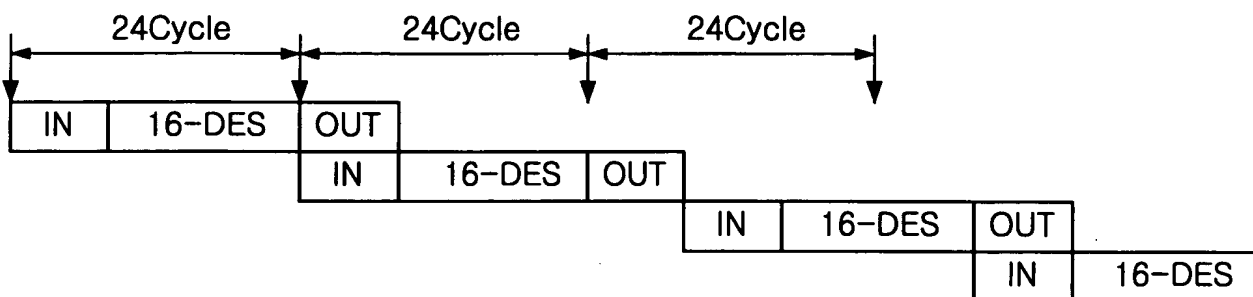
FIG. 14

Traditional 16 Round DES

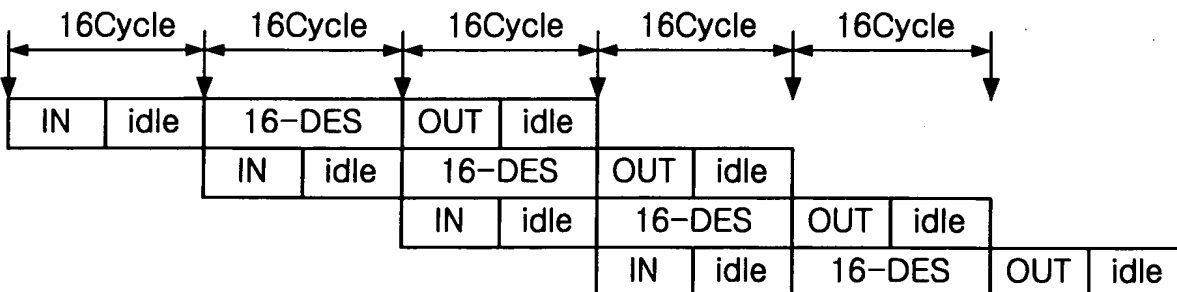
(1) No Latency Hiding (Latency=32, Throughput=1/32)



(2) 2-Stage Macro Pipeline (Latency=32, Throughput=1/24)



(3) 3-Stage Macro Pipeline (Latency=40, Throughput=1/16)



8Round DES (Loop Unrolled Cipher function & Time Multiplexed Cipher Function)

(4) 3-Stage Macro Pipeline (Latency=24, Throughput=1/8)

